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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/694,986	10/29/2003	Masaharu Nagai	12732-171001	5334

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EXAMINER	
CHACKO DAVIS, DABORAH	
ART UNIT	PAPER NUMBER
1795	

NOTIFICATION DATE	DELIVERY MODE
03/09/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

PATDOCTC@fr.com

Office Action Summary	Application No.	Applicant(s)	
	10/694,986	NAGAI ET AL.	
	Examiner	Art Unit	
	DABORAH CHACKO DAVIS	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 December 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,5,6,9,10,20,21,24,25,28,29,32,33,36 and 37* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *2,6,10,21,25,29,33 and 37* is/are allowed.

6)☒ Claim(s) *1,5,9,20,24,28,32 and 36* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 9, 20, 24, 32, 36, are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 4,646,424 (Parks et al., hereinafter referred to as Parks) in view of U. S. Patent Application Publication No. 2002/0151156 (Hallock et al., hereinafter referred to as Hallock).

Parks, in col 2, lines 59-68, in col 3, lines 1-10, in col 6, lines 3-59, discloses a method of forming a semiconductor device by forming a gate electrode on a substrate, forming a positive resist pattern (the resist is photosensitive, contains a photosensitizer) on the gate material film (metal layer), plasma etching (dry etching) the gate material film exposed using the resist pattern as the mask, removing the remaining resist material (after etching the metal i.e., titanium) by using a stripper (stripping the remaining resist, resist removing process, a resist stripper dissolves and removes the remaining resist). The resist pattern is formed by forming a resist layer on a metal layer (such as titanium), exposing the resist, and developing the resist to form a resist pattern (claim 1). Parks, in col 1, lines 8-11, and in col 2, lines 59-65, discloses that the metal film is a titanium film and the titanium forms a gate electrode material in a

thin film transistor (claims 9, and 24). Parks, in col 6, lines 5-7, discloses that the substrate material is glass (claim 20).

The difference between the claims and Parks is that Parks does not disclose that after the dry etch process (etching the metal film using the resist pattern) the resist pattern is irradiated with light. Parks does not disclose that that light irradiated on the resist pattern has multiple wavelengths and/or having wavelength of the photosensitizer in the resist, as recited in claims 32, and 36.

Hallock, in[0015], [0017], [0019], [0020], [0021], and [0025], discloses that the resist pattern is subjected to a UV radiation exposure and then stripping the irradiated resist pattern via a wet stripping process to remove the resist pattern, wherein the exposure uses UV radiation of multiple wavelengths (wavelengths between 150nm to 450nm) or a wavelength region applicable to the photoresist i.e., causing a reaction in the photosensitizer presenting the resist pattern (UV exposure causing a photochemical rearrangement in the resist pattern).

Therefore, it would be obvious to a skilled artisan to modify Parks by employing the method of irradiating the resist pattern after a dry etch process using wavelengths in the claimed range, and stripping as suggested by Hallock, because Hallock, in [0014], discloses that performing the UV exposure prior to the stripping process enables removal efficiency for the subsequent stripping process, and results in a faster throughput with minimal or no blistering.

3. Claim 5, is rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 4,646,424 (Parks et al., hereinafter referred to as Parks) in view of U. S. Patent Application Publication No. 2002/0151156 (Hallock et al., hereinafter

referred to as Hallock) as applied to claims 1, 9, 20, 24, 32, and 36 above, and further in view of U. S. Patent No. 6,645,851 (Ho et al., hereinafter referred to as Ho).

Parks in view of Hallock is discussed in paragraph no. 2.

The difference between the claims and Parks in view of Hallock is that Parks in view Hallock does not disclose the photosensitizer recited in claims 5-6.

Ho, in the abstract, and in col 4, lines 1-19, discloses that the photoresist composition used for forming the photoresist pattern mask is a novolac type resin that includes a photosensitizer such as diazonaphthoquinone compound.

Therefore, it would be obvious to a skilled artisan to modify Parks in view of Hallock by employing the photoactive compound (photosensitizer) suggested by Ho in the photoresist composition because Ho, in col 9, lines 43-54, discloses that adding the claimed photosensitizer (DNQ) in the photoresist composition enables the use of the formed photoresist composition (novolac resin + DNQ) in wavelengths such as 300nm to about 500nm, and also aids in the lowering of the melt temperature of the formed photoresist layer below the glass transition temperature of the novolac resin.

4. Claim 28, is rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 4,646,424 (Parks et al., hereinafter referred to as Parks) in view of U. S. Patent Application Publication No. 2002/0151156 (Hallock et al., hereinafter referred to as Hallock) as applied to claims 1, 9, 20, 24, 32, and 36 above, and further in view of U. S. Patent No. 4,673,808 (Katohno et al., hereinafter referred to as Katohno).

Parks in view of Hallock is discussed in paragraph no. 2.

The difference between the claims and Parks in view of Hallock is that Parks in view of Hallock does not disclose that the resist stripper has a mixture of 2-aminoethanol and a glycol ether (claim 28).

Katohno, in col 5, lines 20-28, and lines 65-67, discloses the use of a Nagase stripper solution (Nagase N-series stripper solution is blend of aminoethanol and glycol ether) to remove the remaining resist pattern (after etch processes).

Therefore, it would be obvious to a skilled artisan to modify Parks in view of Hallock by employing the stripper solution suggested by Katohno because Parks in col 6, lines 55-59, teaches using a resist stripper to remove the remaining resist material and Katohno, in col 5, lines 1-30, discloses that using the claimed resist stripper (Nagase stripper solution) enables the removal of the resist by releasing thus avoiding the presence of the residual portions of the resist pattern on the metal plate to be patterned.

Allowable Subject Matter

5. Claims 2, 6, 10, 21, 25, 29, 33, and 37, are allowed. See Remarks, filed December 18, 2008, on page 7, paragraph nos. 2-3, and page 8, paragraph nos. 1-2.

Response to Arguments

6. Applicant's arguments, see Remarks, filed December 18, 2008,, with respect to claims 2, 6, 10, 21, 25, 29,and 33, have been fully considered and are persuasive. The 35 U. S. C. 103 (a) rejection made over claims 2, 10, 21, 25,

and 22, has been withdrawn. Applicant's arguments, see Remarks, filed December 18, 2008, with respect to the rejection(s) of claim(s) 1, 9, 20, 24, and 32, under 35 U. S. C. 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of U. S. Patent Application Publication No. 2002/0151156 (Hallock et al., hereinafter referred to as Hallock).

A) Applicants argue that none of the references (Parks, Ye, and Bauer) teach irradiating the resist pattern prior to the use of stripping solution and after the resist pattern was formed by exposure and development.

Parks is not relied upon to disclose a UV irradiation step prior to the stripping step i.e., after the exposure and development of the resist pattern, and after etching the underlying metal using the resist pattern as the mask. Hallock is depended upon to disclose the use of a UV irradiation that uses a wavelength that will cause the photosensitizer in the resist pattern to react i.e., cause a photochemical reaction or rearrangement in the resist pattern, and then perform a wet stripping process on the UV irradiated resist pattern to dissolve and remove the resist pattern.

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daborah Chacko-Davis whose telephone number is (571) 272-1380. The examiner can normally be reached on M-F 9:30 - 6:00. If attempts to reach the examiner by telephone are unsuccessful, the

examiner's supervisor, Mark F Huff can be reached on (571) 272-1385. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Daborah Chacko-Davis/
Examiner, Art Unit 1795

March 2, 2009.